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MIMETIC TRUST AND INTRA-ORGANIZATIONAL NETWORK DYNAMICS

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Dynamic network models based on the homophily principle are criticized for neglecting organizational context conditions and the impact of role structures on the evolution of intra-organizational trust networks. Using a neo-institutional framework it is argued that individuals in competitive environments will attempt to reduce uncertainty about the trustworthiness of potential trustees by imitating the sociometric choice behavior of persons in similar network positions. Three hypotheses are developed. The positional trust hypothesis predicts that individuals tend to trust other actors who occupy a similar network position as themselves. The mimetic trust hypothesis argues that individuals trust actors who are trusted by persons in their own network position. Finally, the advisory trust hypothesis claims that individuals prefer to maintain trust relations to persons occupying a position of third party intermediary than to persons in other positions. An exploratory empirical test of the hypotheses is carried out by reanalyzing a longitudinal network study of the relationships among 25 salesmen in the furniture department of a North American retail sales store during the 1950s. Blockmodelling procedures are used to identify structural positions in the networks, and log-linear analysis is applied to determine stability of choices within and between structural positions. The results support the mimetic trust and the advisory trust hypothesis.

INTRODUCTION

During the past two decades, social network analysis made considerable progress in the study of conditions contributing to the emergence, change, and dissolution of social relationships. Also thanks to a

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considerable refinement of the methodological toolkit (Hummon and Fararo, 1995; Leenders, 1995; Snijders, 1996; van de Bunt, 1999; Zeggelink, 1993), a sizable body of knowledge exists about the mechanisms that underlie the creation and transformation of social networks (Doreian and Stokman, 1997), in particular friendship ties (Zeggelink, 1993).

At the same time, organizational scholars became increasingly interested in intra-organizational trust networks because of the efficiency gains related to them. While there is a considerable and still growing body of research on the effects of interpersonal trust networks on organizational outcome variables (for a review see Flap, Völker and Bulder, 1998), relatively little is known about how intra-organizational trust relationships come into being and which factors are responsible for their stability, change, or dissolution.

In this article I argue that one of the theoretical core mechanisms that network scholars usually invoke to explain the evolution and dynamics of social structures – homophily, i.e., the tendency to initiate and maintain relationships with people who are similar to ourselves with regard to some observable trait – is not well-suited to explain the dynamics of interpersonal trust networks in organizations. Building on ideas from neo-institutional theory (Hedström, 1998; Scott, 1995) and Burt's (1982) positional approach to social networks, I develop the argument that an individual's position in the role structure of the informal network has an impact on the formation of interpersonal trust relationships in organizations.

The article is structured as follows. In Section 1, I will briefly sketch the problems of existing theories of network evolution that build on the homophily principle. Drawing on neo-institutional organization theory, Section 2 elaborates three testable hypotheses, which are then tested empirically in Section 3. Data come from a longitudinal network study on intra-organizational trust relationships between salesmen in a North American retail sales store (French, 1963). I conclude with a discussion of the implications of the findings for dynamic network analysis and organization theory.

1 HOMOPHILY AND NETWORK EVOLUTION

Within theories of social network evolution, the homophily effect (Lazarsfeld and Merton, 1954; Festinger *et al.*, 1950) occupies a central

role.[1] It predicts that the more similar two persons are with regard to one or more particular traits, the more likely it will be that they will initiate or maintain a social relationship ("I will become and remain friends with people who are like me"). Homophily usually refers to demographic attributes of people, but it can also include attitudes or behaviors (Blau, 1977 and more recently Popielarz, 1999). That is, it can be based on either visible or non-visible criteria.

After more than five decades of applied sociometric research there is no doubt that the homophily principle is a powerful predictor of social network formation. Homophily based on race, age, religion, education, sex, and social distance explains almost all of the variation in network relations as they were studied in the context of the General Social Survey in the U.S. (Marsden, 1987; 1988). However, there is increasing empirical evidence that it has less explanatory power inside than outside organizational settings (van de Bunt, 1999; Wittek, 1999). The similarity criteria studied here are usually departmental membership, job type, hierarchical position, sex, age, tenure, or education. In his study of two departments of a hospital van de Bunt (1999) found that in the dialysis department there was a significant tendency to initiate relationships with colleagues of the same sex, with age not playing a role at all, whereas in the nursing department employees preferred relationships with colleagues of the opposite sex but of similar age. Similarly, Marsden (1990) shows that homophily based on religious affiliation tends to be lower inside business organizations compared to voluntary associations.

The major reason for these inconsistencies is that homophily can be determined according to any possible attribute, which makes the model theoretically empty. Thus, a satisfying theory needs to specify *ex ante* which homophily criteria will most likely have an impact on intra-organizational network dynamics and which factors won't play a role.

[1] At least two other influential explanations should be mentioned here. First, the *reciprocity effect* (Homans, 1950; Hallinan, 1979) predicts that mutual sociometric choices have a higher likelihood of being stable than asymmetric choices ("I remain friends with people who also consider me as their friend"). Second, the *balancing effect* (Heider, 1958; Mazur, 1971) predicts that the decision to initiate, maintain, or terminate a social relationship depends on the quality of the tie between my friends ("the friend of my friend will become my friend, the enemy of my friend will become my enemy"). For a critical discussion of these mechanisms for organizational contexts see Wittek (1999).

In order to build such a theory, two issues have to be resolved. First, it is necessary to disentangle two factors that influence the formation of network ties: the level of *information* about alter's trustworthiness which ego gradually gathered during personal interactions with alter, and processes of interpersonal *attraction*. Theoretical accounts building on the homophily effect usually do not treat them as two analytically distinct processes. On the one hand, it is assumed that similarity breeds sympathy because "for those with similar values, then (...) social contact, because it is rewarding, will motivate them to seek further contact" (Lazarsfeld and Merton, 1954, p. 30). On the other hand, similarities are also often used to make inferences about the trustworthiness of others. For example, conformity to the elaborate dress code of the merchant guilds in the Dutch Republic signaled to potential trading partners that the bearer belonged to a group which values honesty and heavily sanctions norm violations (Krug, 1999).

Second, one needs to pay more attention to organizational context conditions (Wittek, 1999). For example, in an organization in which severe conflicts emerged about compliance to dress codes, homophily based on physical appearance will probably be more important than in settings where dress is not an issue at all. Research has shown that at least for men, friendship is more likely to develop in an environment of noncompetiveness and interdependence (Farrell, 1985).

In what follows, I will sketch a theoretical framework of intra-organizational network evolution which pays closer attention to the distinction between similarity as a source of attraction, and similarity as a source of information when trustworthiness is at stake. The proposed theoretical framework argues that actors will use the role structure of the informal network as a source of information about each other's trustworthiness. I contend that this approach will be able to account for the empirical inconsistencies in intra-organizational network research, and should therefore complement existing dynamic network models.

2 NEO-INSTITUTIONAL ORGANIZATION THEORY AND THE EVOLUTION OF INTRA-ORGANIZATIONAL TRUST NETWORKS

At the heart of neo-institutional organization theory (DiMaggio and Powell, 1991) are mimetic processes: "Individuals and organizations

deal with uncertainty by imitating the ways of others whom we use as models.... We attempt to imitate others whom we regard as superior, as more successful. One principal indicator of the strength of such mimetic processes is prevalence: the number of similar individuals or organizations exhibiting a given form or practice" (Scott, 1995, p. 45).

One result of these mimetic processes is that actors become similar to each other with regard to particular behaviors or relational patterns. Two cognitive mechanisms shape mimetic processes: *selective attention* (Lindenberg, 1998, p. 725) and the *identification* and subsequent imitation of successful strategies (Hedström, 1998). First, selective attention means that because individuals are unable to process and use all the information they have access to, framing processes will push some pieces of information which individuals use for their decisions into the foreground and others into the background (Lindenberg, 1980). The rules and incentives defining formal organizational *governance practices* will play a crucial role in shaping selective attention of individuals. Where organizational governance practices deliberately favor competition, social ties are often characterized by both cooperative and competitive processes (Abell, 1996). This results in higher potential gains from cheating. I assume that the more an organizational governance practice favors competition, the more likely it will be that the salience of interpersonal attraction as a criterion for relationship formation decreases, and the more the importance to gather reliable information about the trustworthiness of other actors increases.

Second, imitation of successful strategies is based on a heuristic that has been labeled the "principle of social proof" (Hedström, 1998, p. 314): "When in doubt about what to do, always look around at the actions of others for possible clues". Given trustworthiness is at stake, how can individuals identify which strategy to imitate? I argue that individuals will use information about their own and other actors' *positions in the role structure* of the informal network as indicators of successful or less successful strategies.[2] By observing the sociometric choice behavior of their colleagues, individuals are able to identify which actors occupy similar or different positions in the role structure.

[2] See Han (1994) and Reagans (1996) for a similar positional approach to explain inter-organizational relationships.

I hypothesize that this information will influence network evolution in the following three ways.

Positional Trust In a setting in which actors have an incentive to misuse trust, they will search for cues that allow them to judge the trustworthiness of others. Positional similarity can provide a first approximation. Actors who are similarly embedded into the social structure have to face similar opportunities and constraints as oneself. This makes their behavior more predictable than the behavior of people in different positions. In the absence of other reliable cues about the trustworthiness of others, the rule "initiate or maintain trust relationships to alters who occupy a similar position in the role structure of the trust network as you" can be one possible solution to the information problem of potential trustors. This results in the following hypothesis:[3]

POSTITIONAL TRUST HYPOTHESIS The higher the degree of regular equivalence between two actors at t_1, the higher the probability that one of them will initiate or maintain an interpersonal trust relation to the other at t_2.

It should be stressed that the mechanism described by this hypothesis is one of positional homophily, which differs from attributional or attitudinal homophily as it was discussed above in that it is based on information about *behavior*. As such, it can be expected to be a better predictor of future behavior than attitudes or demographical attributes.

Mimetic Trust The positional trust hypothesis assumes that regular equivalence increases the expected probability of alter's trustworthiness. Put differently, the actors use only a limited part of the information available in the role structure. The latter also contains information about who receives trust by whom, and whom those who are similarly positioned as oneself trust. This can be a valuable piece of information in an individual's attempt to come to a more reliable assessment of other actors' trustworthiness. Rather than attempting to judge the trustworthiness of a particular alter himself, ego can try to

[3]Note that this hypothesis elaborates on Reagans' (1996) model, but puts less emphasis on processes of interpersonal attraction (sentiments of collegiality or competition). Reagans argued that structural equivalence is likely to create competitive sentiments and reduce the probability of trust, but that closeness or large resource differences reduce the salience of competitive sentiments.

rely on the judgement of other actors. A straightforward way to do this would be to trust those who receive a lot of trust choices by other actors. However, as was argued above, particularly in competitive settings the fact that A honors B's and C's trust does not necessarily imply that A will also be trustworthy towards myself. A somewhat more promising strategy for ego could consist in imitating the behavior of regularly similar others: if Y is in the same structural position as myself and Y trusts X, then I can also trust X. This claim rests on the assumption that the structural constraints as they follow from an actor's network position also determine the likelihood that he or she is trustworthy. If an individual is trustworthy for a particular set of actors, then she should be trustworthy for a new trustor in a structural position that is similar to those of the other trustors. This insight can be reformulated in form of the following rule: "initiate or maintain ties to alters *who are trusted* by those alters who occupy a similar position in the role structure of the network as you". The resulting hypothesis reads as follows:

MIMETIC TRUST HYPOTHESIS The higher the degree of regular equivalence between ego and alter at t_1, the higher the probability that ego will initiate or maintain an interpersonal trust relationship to actors chosen by alter at t_2.

Unlike the positional trust hypothesis, the mechanism specified in the mimetic trust hypothesis can result in both positional homophily or heterophily. If the actors who occupy a similar position as ego choose to develop interpersonal trust relationships to regularly similar others, then ego also will choose regularly similar others, resulting in a high degree of positional homophily. If they choose actors in different structural positions, then ego will do so, too, with positional heterophily being the result.

Advisory Trust Neither the positional trust hypothesis nor the mimetic trust hypothesis take into consideration that while time passes by, new information about the trustworthiness of the members of the system will become available. Actors can evaluate whether or not their decision to trust a particular other was correct, based on new information that they gather either through their own experience or through hearing from others' experiences. It can be assumed that rather than going on to imitate the behavior of others, individuals will stop to trust those who turned out to be cheaters. Similarly, in the course of time they will also come to know more about how much

information other actors have about the trustworthiness of particular others, how accurate this information is, and how willing these people are to disclose truthful information about these other actors. But actors differ with regard to what they know about the trustworthiness of others, either because they are on average better informed about the trustworthiness of others, or because they dispose of better social skills to detect cheaters (Komorita and Parks, 1994, pp. 30–33). Given they are themselves trustworthy, a relationship with individuals who are willing to disclose truthful information about other actor's trustworthiness will be considered to be more "valuable" than a relationship to somebody who is trustworthy, but either does not dispose of or is unwilling to disclose additional reliable information about the trustworthiness of other persons. Following Coleman's (1990, pp. 180–196) terminology, I will refer to this type of actors as intermediaries of the advisory type. Structurally, advisors put trust into a group of trustees, and are trusted by a group of trustors, who also trust the first group of trustees. Translated into a sociometric choice rule, the resulting principle can be summarized as follows: "maintain interpersonal trust relations with alters who proved to be trustworthy *and* who dispose of as well as are willing to disclose reliable information about the trustworthiness of other actors". The second part of this rule denotes the assumption that advisors dispose of reliable information and/or experience concerning the trustworthiness of others, whereas the first part refers to the assumption that in order to maintain a relationship to an advisor, the latter has to be considered as trustworthy by other actors. If both conditions are satisfied, this rule implies that individuals should be less inclined to dissolve relationships to persons in an advisor position than to persons in other positions:

ADVISORY TRUST HYPOTHESIS *Interpersonal trust relations to persons occupying a position of advisor have higher chances for stability than relationships to persons who do not occupy this structural position.*

3 AN EXPLORATORY TEST: NETWORK DYNAMICS IN A RETAIL SALES STORE

I will carry out an exploratory empirical test of the hypotheses with network data from a study conducted by Cecil French (1963) in the

furniture department of a North American retail sales store from 1954 to 1957. This is also one of the first longitudinal network studies ever carried out in a real-life organizational setting.[4] French's research was explicitly directed towards the investigation of stability of networks (1963, p. 147). However, since the major tools of modern network analysis were not available at the time, French's study remained at a descriptive level. These descriptions, however, are very rich in detail, especially regarding information about organizational governance practices. Since the latter emphasize competition, it is particularly suited for the present purpose of investigating the evolution of trust networks in an organizational setting.

Organizational Context

A closer examination of the course of business in the furniture department reveals a heavy reliance on hierarchial control and the application of rules. Every time a customer entered the store, he or she was approached by the salesman of the furniture department in position one, standing directly at the entrance. In the course of the day, this position was filled on a rotating basis, according to the order of arrival in the morning. The client was then accompanied by this salesman to the furniture department in the first floor. The furniture department, in turn, consisted of different sections (living rooms, dining rooms etc.). The first salesman was allowed to "follow through" the client from one section of the store to another only if he succeeded in selling an item in the first section. If this was not the case, he had to turn over the client to another salesman. In contrast to the first one, the second salesman was allowed to "walk the client" through the whole store, even if the client did not buy anything in his section. The second salesman was appointed by the assistant sales manager among the rest of the salesmen who were currently not busy selling, and sat waiting for their next turn in the common meeting room. Every activity of the salesmen (attempted sale, completed sale, "turn over" and "walked sale") had to be noted on a tag and was delivered to the assistant sales manager. Through hidden electronic

[4] For an earlier reanalysis focusing on balancing, homophily, and reciprocity effects in this data set, see Wittek (1999).

buttons which activated a buzz on his desk each time sections were crossed, he was constantly informed about every movement in the store, making it hard for salesman to break the rules and "dodge a turn over". Thus, coordination is achieved mainly through the intervention of the assistant sales manager, the application of rules and an elaborate technical system of surveillance.

Individual salaries were composed of a fixed weekly base payment, a 3% commission if individual sales exceeded a specific quota, and bonuses for individuals selling unattractive or high profit items. The payment system resulted in a considerable divergence of wages, with individual salaries ranging from $6.000 to $10.000 per year. Besides that, *competition* rather than trust between salesmen was explicitly encouraged by management through frequent sales contests for which free vacation in the Caribbean and luxurious dinners at management's expense were set out as prizes. Thus, given the strong incentive effects of tournaments and salaries with commission (Ehrenberg and Bognanno, 1990; Peterson, 1992), the department can be characterized as a highly competitive environment with a strong emphasis on formal hierarchical control. These aspects of the formal control system are generally seen has being detrimental to the development of close informal relationships on the shopfloor (Burawoy, 1979).

A different picture emerges when one examines the functional interdependencies on the horizontal level. Furniture salesmen depended on each other in so far as the failure of the first salesman to sell something meant a potential benefit for the second salesman, because he gets the opportunity to "walk the client" through the store. Likewise, the success of the salesman in position one deprived the rest from earning money from this specific client. It is obvious that the crucial event in the first case is that the client is in fact turned over to the second salesman.

There was one regulation, compliance to which could not be enforced through either technical or hierarchical devices. It specified that "should a customer ask for a salesman by name, this salesman was to be given the call, regardless of his place in the rotation system" (French, 1963, p. 150). As clients seemed to ask for specific salesmen rather frequently, and individual performance created large variations in annual income, "stealing a trade" could have serious adverse effects on the income and bonusses of a colleague. It is therefore not surprising when French mentions that the informal norms in the

furniture department "were concerned with protecting the members of the group from the depredations of the overly competitive individual. There was a total agreement that stealing personal trade was a serious violation, and over the four-year period the salesman were continually concerned with this problem" (French, 1963, p. 150).

In sum, the salesmen were continuously confronted with a trust problem. The salesman who complied to the informal rule not to steal a colleague's trade could not be sure whether this colleague would do the same.

Data

French (1963) traces the development of "friendship" choices among the group of 25 furniture salesman over a half year period, providing information on the total friendship network for three points in time. Twelve salesman were Jews. The group formed one department (furniture) within the store, where a total of 65 salesmen were employed.

For all three points in time, salesmen were asked to name those two or three persons they liked best. At t_1 (October 1954), the network consisted of 25 members. When the second network was recorded (December 1954), Brim – who received the highest number of choices at t_1 – had been transferred to a branch store in a nearby city for a period of two months. Nevertheless, salesmen were allowed to choose him at t_2. At t_3 (March 1955), four salesmen were laid off (Simmons, Callahan, Morgan and Lerner), while one new colleague had joined the group (Beard). At t_3, salesmen were also asked to indicate those colleagues they liked least, resulting in nine persons receiving a total of 29 negative choices.

The data and subsequent analysis have three major limitations. First, there is turnover during the period of observation, with four actors permanently leaving, one actor temporarily leaving, and one new actor joining the group. The present analysis will not address this type of change in the network. Likewise, this analysis will also neglect the potential effects of the temporal removal of the most central actor. Second, information on attributional homophily is given only on the aggregate level for t_1, whereas negative choices are given only for t_3. Third, the number of choices actors could made was restricted to two

to three. Nevertheless, French's account is rich enough for a first exploratory analysis of the substantial questions addressed here.

Method

For the present analysis, the role structure is conceptualized in terms of regular equivalence. One of the crucial features of the informal structure at hand is the relative frequency of asymmetric ties. Regular equivalence is the most appropriate conceptualization of social structure in this case (Doreian, 1988, p. 275), because structural equivalence will fail to detect horizontal differentiation within asymmetric hierarchies. Two actors are regularly equivalent if they exhibit a similar pattern of relations to all the other actors in the network. They do not have to share common contacts in order to be considered as similar, nor do they have to know the same third persons in common (as would be the case under the structural equivalence criterion). This allows the detection of actors with similar roles. A blockmodel analysis is carried out for the positive choices at each of the three measurements. For each point in time, a solution with four positions was chosen (see Figures 1–4).[5] The blockdensities and blockmodels are represented in Table 1.

Existing tools to assess network change usually cover individual choice behavior and do not permit inferences about stability or change in the role structures in the network (Schwartz, 1977). To accomplish the latter, I use a procedure suggested by von Collani (1985). Dyads are defined as relations through time between the $n(n\text{-}1)$ members of the network. The test is carried out for stability between t_1 and t_3. A relation between i and j can be present or absent, which produces four types of intertemporal dyads:

(1) $D_{ij} = \langle 1,1 \rangle$ i chooses j both at t_1 and t_3,
(2) $D_{ij} = \langle 0,0 \rangle$ i does not choose j neither at t_1 nor at t_3,
(3) $D_{ij} = \langle 1,0 \rangle$ i chooses j at t_1, but not at t_3,
(4) $D_{ij} = \langle 0,1 \rangle$ i does not choose j at t_1, but at t_3.

[5] The choice of the four-position solution also has pragmatic reasons. REGE is a bipartitioning algorithm and the network is relatively small. A two-position solution would by definition exclude the possibility to test the advisory trust hypothesis, while splits with more than four positions would lead to extremely sparse positions. Of course, the choice of the four-position solution could also be empirically grounded by comparing the fit of this solution to other splits.

TABLE 1
Blockmodels and Blockdensities of the Trust-Network at Three Points in Time
A. Blockmodel of the Trust-Network at T_1

ID	Name	Trustees						Trustors									Advisors					Isolates				
		1	2	12	13	7	14	6	4	11	15	22	23	18	8	24	7	19	5	9	25	3	16	21	10	20
1	Brim	x	1																			1				
2	Murphy	1	x																			1				
12	Blumberg			x	1		1																			
13	Plotkin			1	x		1																			
17	Green					x																				
14	Beere			1	1		x																			
6	Isaacs	1						x									1									
4	Abramowitz	1							x											1						
11	Zellner									x								1							1	
15	Howell										x							1					1			
22	Solomon			1	1							x														
23	Lerner	1	1										x													
18	Berger					1								x				1								
8	Morgan	1													x											
24	Callahan															x			1		1					
7	Atkinson	1															x			1						
19	Singer	1												1				1								
5	Radin	1							1										1							
9	Morgenstern				1		1													x						
25	Simmons				1																x					
3	Holzer	1	1																			x				
16	Wolff										1												x			
21	Feinstein																							x		
10	Meister									1															x	
20	Horn																									x

B. Blockdensities of the Trust-Network at T_1

T_1	Trustees	Trustors	Advisors	Isolates
Trustees ($n = 6$)	.833 (1)	.000 (0)	.000 (0)	.273 (0)
Trustors ($n = 9$)	.733 (1)	.000 (0)	.714 (1)	.286 (0)
Advisors ($n = 5$)	.727 (1)	.286 (0)	.200 (0)	.000 (0)
Isolates ($n = 5$)	.273 (0)	.286 (0)	.000 (0)	.000 (0)

mean = .288.

Note: Zero and one-blocks in brackets. The blockstructure is based on all 25 members of the department. If the four members who left at t_3 are excluded from the analysis, the same blockstructure emerges. Zero- and one-blocks remain the same. Whether a block is a one-block or a zero-block has been determined by first summing those rows and columns which have at least one positive entry. This figure is then divided through the total number of rows and columns. A block is a one-block if this value is bigger than the mean. This procedure is used instead of calculating the "normal" density of the block, because the search procedure of the algorithm does not maximize within-block density but similarity between adjacent vertices. Standard densities can therefore be expected to be generally low. I am indebted to Tom Snijders for these suggestions. Analysis was carried out with the software package UCINET IV (Borgatti, 1991).

C. Blockmodel of Trust-Choices at T_2

ID	Name	Trustees						Trustors								Advisors					Isolates					
		1	14	9	13	5	12	11	3	8	15	22	23	21	25	4	2	24	7	19	20	6	16	17	18	10
1	Brim	x																								
14	Beere		x		1		1																			
9	Morgenstern			x																						
13	Plotkin		1		x		1																			
5	Radin					x										1										
12	Blumberg		1		1		x																			
11	Zellner							x												1						1
3	Holzer	1							x																	
8	Morgan									x						1		1								
15	Howell										x									1			1			
22	Solomon				1		1					x														
23	Lerner	1											x													
21	Feinstein		1	1										x												
25	Simmons				1										x			1								
4	Abramowitz			1		1										x										
2	Murphy	1															x									
24	Callahan					1									1			x								
7	Atkinson																1		x							
19	Singer					1													1	x						
20	Horn																				x					
6	Isaacs																					x				
16	Wolff									1													x			
17	Green																							x		
18	Berger																								x	
10	Meister							1																		x

D. Blockdensities of the Trust-Network at T_2

T_2	Trustees	Trustors	Advisors	Isolates
Trustees ($n = 6$)	.50 (1)	.00 (0)	.18 (0)	.00 (0)
Trustors ($n = 8$)	.63 (1)	.00 (0)	.54 (1)	.29 (1)
Advisors ($n = 5$)	.64 (1)	.15 (0)	.40 (1)	.00 (0)
Isolates ($n = 6$)	.00 (0)	.29 (1)	.00 (0)	.00 (0)

mean = .226.

E. Blockmodel of Trust-Choices at T_3

ID	Name	Trustees						Trustors							Adv.			Isolates					
		1	2	14	13	18	12	15	4	9	6	22	3	8	5	19	7	10	16	17	20	21	11
1	Brim	x	1										1										
2	Murphy	1	x																				
14	Beere			x	1		1																
13	Plotkin			1	x		1																
18	Berger					x																	
12	Blumberg			1	1		x																
15	Howell							x							1			1					
4	Abramowitz	1							x						1								
9	Morgenstern			1						x					1								
6	Isaacs	1									x						1						
22	Solomon				1		1					x											
3	Holzer	1		1									x										
8	Beard (new)	1												x									
5	Radin	1							1						x								
19	Singer					1									1	x							
7	Atkinson	1													1		x						
10	Meister																	x					1
16	Wolff							1											x				
17	Green																			x			
20	Horn																				x		
21	Feinstein																					x	
11	Zellner																	1					x

F. Blockdensities of Trust-Choices at T_3

T_3	Trustees	Trustors	Advisors	Isolates
Trustees ($n = 6$)	.83 (1)	.15 (0)	.00 (0)	.00 (0)
Trustors ($n = 7$)	.84 (1)	.00 (0)	.70 (1)	.15 (0)
Advisors ($n = 3$)	.55 (1)	.20 (0)	.66 (1)	.00 (0)
Isolates ($n = 6$)	.00 (0)	.15 (0)	.00 (0)	.33 (1)

mean = .285.

The first two types of dyads are stable ones, the latter two are instable. Table 2 depicts the frequencies of the four types of dyads. This information can be combined with the membership of persons in a position at t_1 and t_3 (Table 3). Technically speaking, this is a W-array, with positional membership being the actor attribute. For a technical introduction, see Wassermann and Faust (1994, pp. 635ff).

Based on the frequency distribution as it is given in the four-dimensional contingency table (Table 3), hierarchical loglinear modeling is used to statistically test in how far both the positions and the individual choices are stable (von Collani, 1985). The units of analysis are intertemporal dyads as they were defined above. The

TABLE 2
Stability of Individual Choices

		Choice at t_3		
		0	1	Total
Choice at t_1	0	383	3	386
	1	7	27	34
	Total	390	30	420

TABLE 3
Stability of Positions from T_1 to T_3 (W-Array)

			Position at t_3 (Variable B)							
			Trustee		Isolate		Trustor		Advisor	
		$C_{\downarrow}$:	D: 0	1	0	1	0	1	0	1
Position at t_1 (Variable A)	Trustee	0	23	0	34	0	18	0	35	0
		1	0	8	1	1	0	0	0	0
	Isolate	0	28	0	28	0	15	0	25	0
		1	0	2	0	1	0	0	0	1
	Trustor	0	31	0	32	0	13	0	32	0
		1	0	4	0	0	2	3	1	2
	Advisor	0	18	0	21	0	6	3	24	0
		1	2	4	1	1	0	0	0	0

A = Position at t_1; B = Position at t_3; C = Choice at t_1; D = Choice at t_3; Read: Of the possible choices made from persons in position 1 at t_1 to those in position 1 at t_3, 23 are null choices at both moments and 8 are positive choices at both moments, while no choices are null at one moment and positive at the other. This position would intuitively be considered as relatively stable. For the analysis of change from t_1 to t_3, the networks had to be reduced to those actors that are present at both points in time. This lead to an exclusion of 5 actors (Morgan, Lerner, Callahan, Simmons, Beard).

analysis uses four variables: positional membership at t_1 (A) and t_3 (B), choice at t_1 (C) and choice at t_3 (D).

The frequencies of the sociometric choices made by the members of one position at t_1 to the future members of a position at t_2 are interpreted as an indicator for stability of this position. Translated into the loglinear model this implies that positional stability is given if the three-way interaction ABC (i.e., position at $t_1 \times$ position at $t_3 \times$ choice at t_1) is present (von Collani, 1985). Likewise, individual choices will be considered as stable through time if the two-way interaction CD (i.e., choice at $t_1 \times$ choice at t_3) is present. The latter represents the interrelationship between the individual sociometric choices at both points in time independently of positional stability. It is represented in Table 2. In other words: a model without the effect CD would signal that individual choices are unstable, whereas a model without the effect ABC would indicate positional instability.

Results

The four positions in Figure 1 can be characterized as follows. One position contains the *trustees* or attractors of trust ($n = 6$ at all three points in time). The members of this position do not reciprocate the choices of persons from other positions, but direct their choices to persons in their own position. The second position is one of *trustors*, i.e. allocators of trust. It is the largest group at all three points in time (9, 8, and 7 members, respectively). They choose actors in other positions and avoid choosing actors in their own position. The third position ($n = 5$ at t_1 and t_2 and $n = 3$ at t_3) in fact resembles Coleman's (1990) intermediaries of the *advisor* type. It consists of persons who direct their choices towards the members of the position of the trustees and who are chosen by the position of trustors, who also put trust into the trustee. The fourth position is the only one that is disconnected from the other three positions at t_1 and t_3, which would suggest to label its members as *isolates*. With 5 members at t_1 and 6 at t_2 and t_3, this position is as large as the rest.

A closer examination of the choice behavior of the four types of actors reveals the following picture (see Table 4). With one exception (Green), the position of *trustees* unites persons having two reciprocated choices plus at least one received choice, which they do not

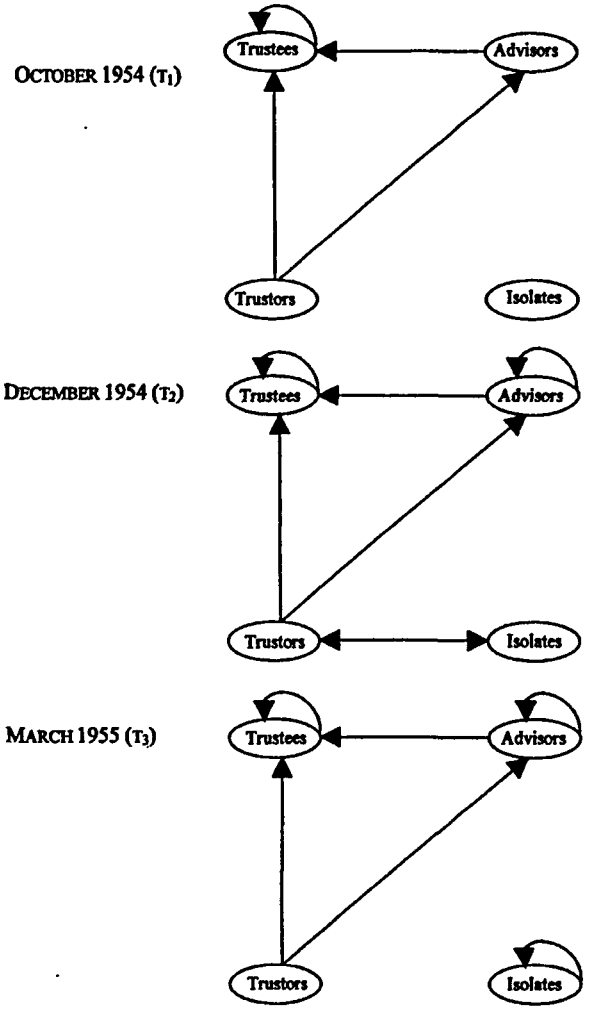

FIGURE 1 The role structure at three points in time.

reciprocate. The *trustors* either only send choices that are not reciprocated, or do so and have one reciprocated tie in addition. The *advisors* send and receive unreciprocated ties. Finally, the *isolates* are not chosen and do not choose anyone, *or* have one or two reciprocated choices. The latter fact reveals that at least for three members of this position, the characterization as "isolate" is misleading. At t_1, Holzer

TABLE 4
Actor and Dyad Types as Revealed by the Rege-Algorithm

Actor Types	Dyad Types			
	Only Send	Only Receive	Send and Receive	Neither Send nor Receive
Trustees	−	+	+	−
Trustors	+	−	+	−
Advisors	+	+	−	−
Isolates	−	−	+	+

− = absent; + = present.

is part of a clique with two members of the position of the trustees, Brim and Murphy. He is allocated to the position of trustors at t_3. Meister and Wolff each maintain one reciprocated tie with members of the position of trustors, Zellner and Howell. Only Feinstein, Horn and Green can be considered to be isolates in the true sense of the word.[6] Though the actors in the position of isolates exhibit two different relational patterns (true isolates vs. salesman who only have reciprocated ties), the relational patterns of all of them differ from the one of actors in the three other positions.

In sum, the chosen four-position solution also corresponds with four unique patterns of sending and receiving sociometric choices (see Table 4). This increases the chance that the positions as they were identified by the partitioning algorithm in fact mirror *recognizable traits of individual salesmen (i.e., patterns of sociometric choice behavior that can be observed by the individuals in the social system under study).* The latter of course is a necessary precondition for the actual realization of the postulated cognitive mechanisms.

On a descriptive level, the role structure can be considered to be stable in the sense that the same structural positions that are present at t_1 are still present at t_3 and that positions at t_1 and t_3 exhibit strong overlap in size and composition. However, four salesmen change their position from t_1 to t_3. Green leaves the position of trustors and joins the isolates. Holzer, who is characterized as a member of the "isolate" position at t_1, is located in the trustor position at t_3. Berger, who was a

[6] In this context it should be kept in mind that the absence of ties from the position of "isolates" to the trustors and trustees is a result of the dichotomization procedure that has been applied (see the note in Table 1).

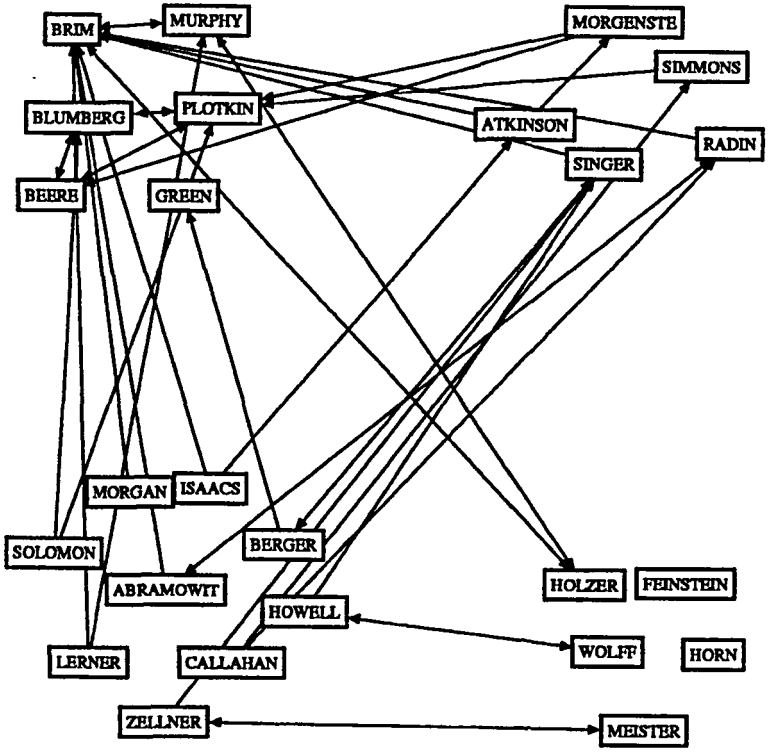

FIGURE 2 Network of trust choices at T_1.

member of the trustor position at t_1, becomes a member of the position of trustees at t_3. Morgenstern, characterized as a member of the advisor position at t_1, becomes a member of the trustor position at t_3. Thus, the structural perspective reveals that while only 8 of the 420 individual choices made during all three points in time are classified as unstable (see Table 2), they nevertheless imply a change in structural position for 16% of the salesmen.

Concerning the *Positional Trust Hypothesis*, the following observations can be made. As can be seen in Figure 1, a rise of within-position interaction can be observed for three of the four positions. At t_1 only the trustees exhibited the tendency of choosing trustees. At t_2, also the intermediaries show a stronger preference for choosing actors of their own position. Finally, at t_3 three positions with high within-position interaction have emerged, with the isolates also directing more choices

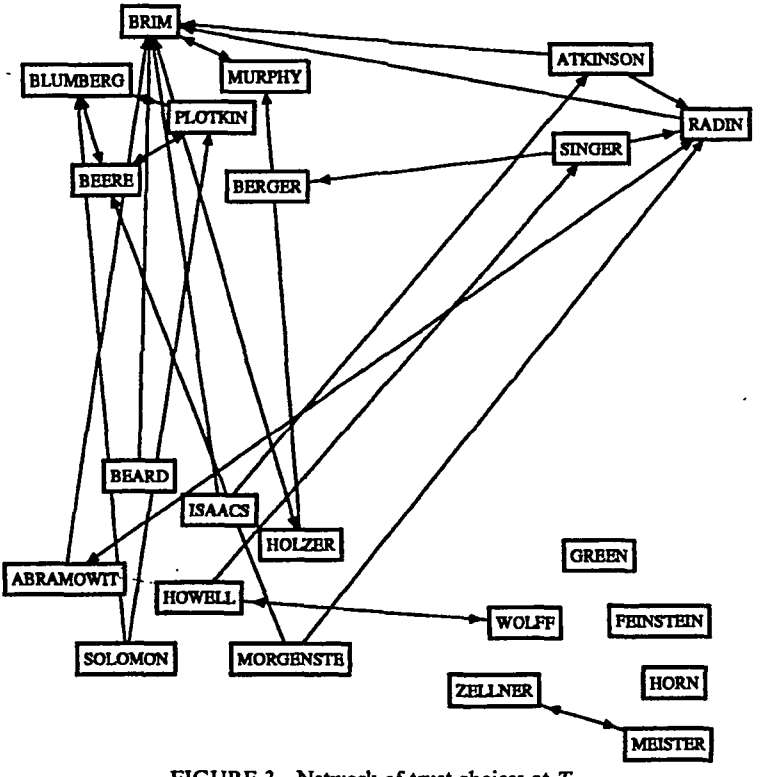

FIGURE 3 Network of trust choices at T_2.

to members of their own position. As such, these tendencies would support the *Positional Trust Hypothesis*, which postulated that actors will tend to initiate or maintain ties to regularly similar others.

However, as can also be seen from Figure 1, the position that does not fit into this pattern are the trustors who seem to *avoid* trusting each other. They seem to prefer trust relations with intermediaries and those persons in whom intermediaries put trust, but not to other trustors. In sum, the positional trust hypothesis fails to account for two processes in the network: it does not explain why within-position interaction remained low among the trustors and not among the other positions, and it cannot account for the existence and stability of the links between the positions.

The *Mimetic Trust Hypothesis* does a better job in both respects. It can explain why the trustors and not any of the three other positions

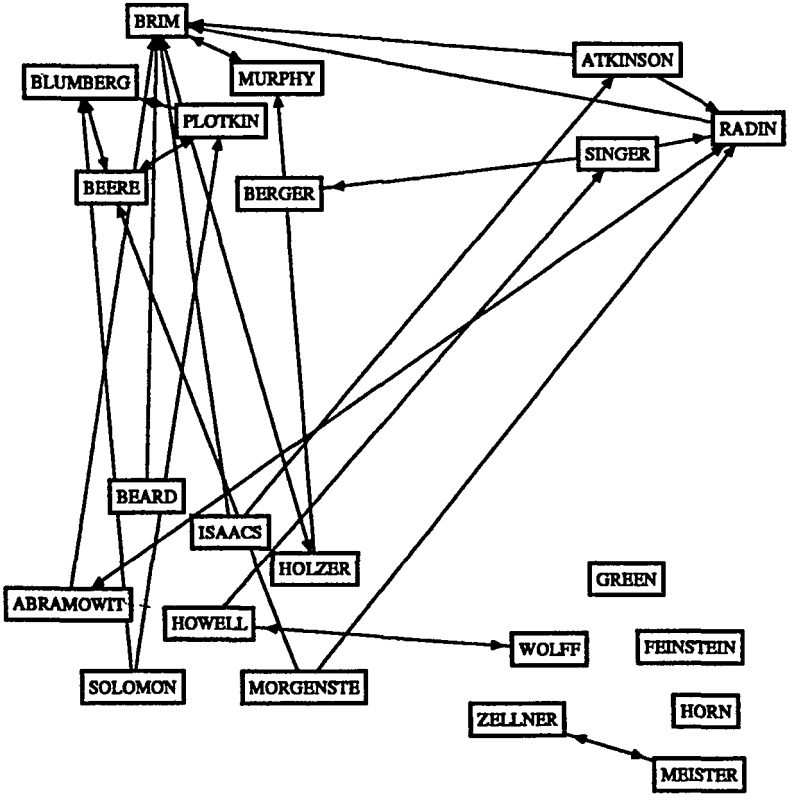

FIGURE 4 Network of trust choices at T_3.

fail to increase interaction with each other. Trustors as they are defined in the present role structure do not receive many trust choices themselves. This makes them problematic as candidates for trust relations, because others see that nobody else is trusting them. Their trust choices are neither frequently reciprocated, nor are they trusted by members in their own structural position. Consequently, the rule to trust those who are trusted by regularly similar others seems to provide a better approximation to the present network structure than the less complex rule to trust those who are regularly similar.

Some comments are necessary with regard to the relationships of the isolates. In the dichotomized version, a reciprocal trust relationship has developed between the trustors and the isolates at t_2. Contrary

to what the Mimetic Trust Hypothesis predicts, this link dissolves again at t_3. When examined at the level of individual choices, it becomes evident that already at t_1, two of the four choices made by members of this position were directed towards the position of trustors. These two choices remained stable also during the following two points in time, only that at t_3 Zellner dissolved his relationship to Singer. The result is that the algorithm allocates him to the position of isolates. The changes involving the position of isolates apparently are due to changes in the choice behavior of members of the other positions, rather than to changes in the choice behavior of the isolates themselves. The latter is at least partly consistent with the Mimetic Trust Hypothesis.

The findings with regard to positional and mimetic trust are particularly interesting when compared to the declining importance of attributional homophily. French (1963) reports that while at t_1 there was a statistically significant tendency for the salesmen to trust those with the same ethno-religious background (Jews trust Jews, Non-Jews trust Non-Jews), this relationship became non-significant at later stages. Unfortunately, French did not provide the details to verify this claim. Given his calculations are correct, they would be in line with the present argument: attributional similarity was taken as an indicator for trustworthiness in the beginning, but lost its reliability while the network was evolving.

According to the *Advisory Trust Hypothesis*, one would expect that the links between the trustors and the advisors would have the highest probability of being stable. What remains stable through all three measurements are the three relationships between the positions of the trustors, the advisors, and the trustees.

Up to this point, data-analysis was restricted to a description of the changes in within-position and between-position densities. The log-linear analysis allows to assess the statistical importance of the changes. Table 5 gives an overview of the different models fitted to the data. As can be seen, model 1 – which was the theoretically specified and most parsimonious model in which both positions and individual choices were predicted to be stable – does not fit the data well. A further reduction of the number of parameters does not result in an increase of fit: neither model 2, in which the interaction effect containing the individual choices at t_1 and t_3 (CD) was deleted,

TABLE 5
Results of Hierarchical Loglinear Analysis

Model	Likelihood χ^2	df	p
1. ABC, CD	42.15	30	.069
2. ABC, D	192.72	31	.000
3. AB, AC, BC, CD	59.74	39	.018
4. ABD, CD	45.33	30	.036
5. ABC, ABD, CD	16.48	15	.351
6. ACD, BCD, ABD	23.86	18	.160
7. ABC, ACD, BCD	16.68	18	.545

A = Position at t_1; B = Position at t_3; C = Choice at t_1; D = Choice at t_3.

nor model 3 – which lacks the three-way interaction of positional stability (ABC) – yield a satisfying fit. The same holds for Model 4. Adding more second-order interactions to model 1 yields better results. Model 5, which contains both second-order interactions fits well to the data.[7] It is also the most parsimonious model with a satisfactory fit to the data. Model 6 would also have an acceptable fit, but contains three second-order interactions and would therefore be very difficult to interpret, whereas Model 7 is likely to contain too many parameters.

The presence of the two theoretically specified effects (ABC and CD) in this model indicates that besides the individual choices, also the role structure can be considered as stable. That is, the stability of the intertemporal links between the four positions is higher than one would expect by chance. An inspection of the standardized λ-parameters of Model 5 reveals that two relationships are significant (Table 6). First, the link between the position of trustors and the position of advisors. The sign of the parameter is positive, which means that members in the position of trustors have a significant tendency at t_1 to direct their choices towards persons who also occupy a given position at t_3, namely the advisors. Second, the intraposition-choices denoting the links among advisors. However, the sign for this relationship is negative, indicating that the relationships among advisors tend to be unstable through time. Advisors who choose each other at t_1 tend not to

[7] Following Knoke and Burke (1980, p. 31), p-values between .10 and .35 are preferred. Models with higher p-values might include unnecessary parameters.

TABLE 6
Standardized λ-Parameter Estimates (Z-Values) for the Interaction ABC (Model 5)

Position at t_1	Position at t_3			
	Trustees	Trustors	Advisors	Isolates
Trustees	.16	.72	.14	−.74
Trustors	−1.22	−1.34	2.22*	.34
Advisors	1.52	.70	−2.14*	.08
Isolates	−.46	−.08	.06	.48

*$p < .05$, one-tailed. The interaction effect ABC (position at t_1 × position at t_3 × choice at t_1) represents the frequency of stable choices between positions.

choose each other at t_3.[8] In addition, the estimates for the relationships among the trustors as well as for the relationship of the trustors to the trustees are both negative, but fail to reach significance. The parameter for the advisors choosing the trustees is positive and is the strongest of the non-significant effects ($p = .13$). Thus, the most robust interposition choices in this group consist in the trustors choosing the advisors, and the advisors choosing the trustees.

In sum, the findings of the log-linear analysis lend support to the *Advisory Trust Hypothesis*. Based on the assumption that because a trust relationship to an advisor is valued more than a trust relationship to somebody who is trusted by regularly similar others, these links exhibit a stronger tendency towards stability than other interposition relationships.

Discussion and Conclusion

The present study addressed the issue of the development of interpersonal trust relationships under conditions of competitive organizational governance practices. It was suggested that existing dynamic network models could benefit from arguments developed by neo-institutional organization theory. More specifically, it was argued that the well-established homophily principle should be complemented by

[8] This result should be considered with caution, since the position of advisors lost 50% of its members from t_1 to t_3. This violates the requirement of stable sizes of positions as it was formulated for the statistical method used here (von Collani, 1985).

incorporating the impact of formal governance practices and informal role structures on interpersonal trust relationships. Using a neo-institutional framework it was suggested that individuals in competitive environments will attempt to reduce uncertainty about the trustworthiness of potential trustees by imitating the sociometric choice behavior of regularly similar others. The findings favor such an interpretation.

By introducing the dimensions of organizational governance practices and network positions, the present approach differs from other dynamic network models in two important respects. First, due to its focus on affective choices in non-organizational settings, dynamic network research overlooked the often double-edged nature of social ties in work-contexts. Second, they focus primarily on what happens within a particular social relation. By looking mainly at processes of contagion in isolated dyads, such a relational network model (Burt, 1982) neglects what happens in the social "environment" of a relationship. In contrast, the present approach builds on the idea that the more similar two actors are with regard to their *position* in the network (the higher the degree of regular equivalence), the more similar they will be with regard to their structural constraints, interests, as well as preferences for interaction – independently of the existence of a personal tie to these persons.

The research design and the applied statistical methodology have some limitations, which should not be overlooked. Two of them are particularly relevant. First, the present analysis and interpretations rest strongly on the chosen four-position partition and the procedure of determining one-blocks and zero-blocks. Both introduce a certain arbitrariness in the analysis and raise the danger of creating methodological artifacts. Second, the statistical method used to assess positional stability might be too coarse to deal with the recursive inter-relationship between changing individual choices and emerging role structures, since one of the requirements for applying the model is that clusters do not change too much in composition and size (von Collani, 1985, p. 87). The statistical model applied here also does not allow to draw any conclusions about the *relative* contribution of or interaction between each of the three postulated mechanisms. Application of more sophisticated dynamic network models (e.g. Snijders, 1996) might offer solace in this respect.

From the perspective of organization theory, the present study shows that it might be fruitful to investigate network evolution under different organizational governance practices. Furthermore, the study of intra-organizational trust might benefit from paying more attention to principles of "rational imitation" (Hedström, 1998). At least in the organization under study, imitating the behavior of those who occupy a similar position in the role structure of the informal network as oneself seems to have played a crucial role for the creation and maintenance of social relationships in a highly competitive environment.

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